

**Rejection of Claims 1-12 under 35 U.S.C. 103(a) as being unpatentable over Edwards (US 5,493,937) in view of Bazille (FR 2780698).**

The last Office Action rejected claims 1 – 12 as being obvious to one of ordinary skill in the art to modify the adapter assembly of Edwards with the teachings of Bazille. The Applicant requests reconsideration of this rejection, as now applicable to rewritten claims 13 – 22, for the following reasons:

- 1) There is no justification in either Edwards or Bazille which suggests these references be combined, much less combined in the manner proposed.
- 2) The novel physical features of claims 13 – 22 produce new and unexpected results and hence are unobvious and patentable over these references.
- 3) Both Edwards and Bazille are individually complete such that there would be no obvious reason to combine the adapter assembly of Bazille with the spindle assembly of Edwards.
- 4) Edwards and Bazille teach away from each other by taking mutually exclusive paths to reach different solutions to a problem.
- 5) Even if the adapter portion of Edwards were modified with the teachings of Bazille, the combination would not show all of the novel physical features present in claims 13 – 22.

**The References And Differences Of The Present Invention Thereover**

Prior to discussing the claims and the above five points, the Applicant will first discuss the references and the novelty and unobviousness of the present invention over the references.

~~Edwards~~ attempts to solve several problems associated with attaching crank arms to a bottom bracket spindle. As stated under Edwards's Summary Of The Invention, the primary purpose of his invention is to eliminate the two crank arm adapting portions provided on the ends of previous bottom bracket spindles and replace them with integrated crank arm/spindle pieces, thus creating only one joint attaching the crank arm/spindle pieces together. To accomplish this, Edwards splits the spindle into two tubes and integrates these tubes with their respective crank arms. The integrated crank arm/spindle pieces are joined together inside the bottom bracket ~~between~~ the two cartridge bearings. This is in stark contrast to the Applicant's invention in which the crank arms are separate from the spindle altogether and joined to the spindle through adapting portions at both ends of the spindle exterior from each cartridge bearing. The advantage of the Applicant's invention is that the crank arms themselves are compatible with a wide variety of different bottom bracket assemblies, so long as the crank arm adapting portions on the spindle ends are themselves of the same design. Thus, the user is not required to buy a completely new bottom bracket assembly when a crank arm is damaged or a completely new set of crank arms when a spindle is worn out. The system is open and compatible with a wide variety of existing crank arm designs.

In Edwards's attempt to join the crank arm/spindle pieces together, each piece must be able to slide inside the inner races of the two cartridge bearings and subsequently bolted together. Thus, *one* of the inner races is clamped between the two crank arm spindle pieces while *the other inner race must be free to float in both axial directions on the spindle*. If at least one inner race is not free to float axially on the spindle it would be impossible for the crank arm and spindle pieces to be assembled in the manner disclosed by the invention. Thus, Edwards's bearing arrangement is a consequence of his solution to integrate the crank arm and spindle pieces and join these two parts within the bottom bracket between the two cartridge bearings. The Applicant's invention on the other hand *fixes the inner races of both cartridge bearings in both axial directions* on the spindle.

To allow for tolerances associated with each specific assembly of his crank arm/bottom bracket system, Edwards relies upon spacers (28) to adjust the axial position of the crank arms such that

they are correctly aligned with the ideal chain position. This is troublesome and error prone for the person assembling the system. Problems with chain alignment can cause serious performance degradation during chain shifts and leads to reduced efficiency. Further, these spacers are separate from the actual bottom bracket assembly and therefore easily lost or misplaced. The Applicant's invention does not require such spacers or adjustment during assembly. The axial location of the attached crank arms is dictated by the location of the outer stop elements (which are affixed to the spindle) relative to the outer bracket portion; this can be easily and accurately controlled by the bottom bracket manufacturer. In this way the manufacturer of the bottom bracket and the manufacturer of the crank arms can design the ideal location of the crank arms relative the frame and be assured that this location will always be the same regardless of user assembly procedures.

Edwards shows the outer bearing races of both cartridge bearings as being fixed in the axial direction within his outer bracket portions. In fact, in column 5 lines 16 and 17 of his Specification, Edwards teaches "Each bearing cup (12a and 12) *permanently* holds one of the two cartridge bearings..." [emphasis supplied]. The Applicant's invention on the other hand requires at least one of the outer bearing races to be axially moveable in both directions with the outer bracket portion. This feature is not present within and completely opposite from the teachings of Edwards.

**Bazille** also attempts to solve a problem associated with attaching crank arms to a bottom bracket spindle, but takes a completely different direction than Edwards. In Bazille's invention, he maintains two crank arm adapting portions on the ends of his bottom bracket spindle but changes the method of crank arm attachment to provide threads on the exterior of the crank arm adapting portions for engagement with a nut. Bazille does not utilize cartridge bearings within his bottom bracket but instead forms the races directly on the spindle. Thus, there are no cartridge bearings with associated inner races, no inner stop elements, and no outer stop elements. Bazille's design therefore suffers from the problems discussed by the Applicant in his Specification, namely that the spindle must be made very hard and brittle as a result of the high

bearing contact stresses and therefore will have low energy absorption capabilities, a very undesirable characteristic for a bicycle bottom bracket spindle.

The outer races used in Bazille's bearing assembly are also different from the Applicant's invention. As mentioned, Bazille does not utilize cartridge bearings and instead uses grooves formed on the spindle for inner bearing races with separate outer races. However, as stated in the Applicant's original Specification (page 2, line 11), one of the advantages of using cartridge bearings is their ease of replacement when they get worn or damaged. The bearings shown in Bazille invention cannot be separately replaced apart from the other bottom bracket components as the cartridge bearings utilized in the Applicant's invention can be.

Bazille's arrangement for the outer bearing races is also different from that claimed by the Applicant. Bazille clearly shows one of his outer bearing races (11) being *fixed in both axial directions* within his outer bracket portion (3) while the other outer bearing race (12) *abuts the cylindrical sleeve* (4). This is clearly depicted in Figures 2 and 8 of Bazille. Though a gap does exist between the outer bearing race (12) and the shoulder present on the adapter portion (5), the outer bearing race (12) is not free to move in this direction since it is constrained from doing so by its associated ball bearing and spindle groove. More importantly however, *Bazille does not disclose a gap between the cylindrical sleeve (4) and the abutting outer bearing race (12)*. Therefore, Bazille's outer bracket portion (3) and included cylindrical sleeve (4) must be manufactured to very close tolerances associated with the bearing grooves formed in Bazille's spindle in order to maintain correct axial alignment of the bearing races. This is the exact problem that the Applicant's claimed invention overcomes by requiring at least one outer bearing race be free to move in *both* axial directions.

**Edwards And Bazille Do Not Contain Any Justification To Support Their Combination, Much Less In The Manner Proposed.**

With regard to the proposed combination of Edwards and Bazille, in order for any prior-art references themselves to be validly combined for use in a prior-art rejection under § 103, the

references themselves (or some other prior-art) must suggest that they be combined. For example, as was stated in In re Sernaker, 217 U.S.P.Q. 1, 6 (C.A.F.C. 1983):

“[P]rior art references in combination do not make an invention obvious unless something in the prior art references would suggest the advantage to be derived from combining their teachings.”

That the suggestion to combine the references should not come from the Applicant was forcefully stated in Orthopedic Equipment Co. v. United States, 217 U.S.P.Q. 193, 199 (CAFC 1983):

“It is wrong to use the patent in suit [here the patent application] as a guide through the maze of prior art references, combining the right references in the right way to achieve the result of the claims in the suit [here the claims pending]. Monday morning quarterbacking is quite improper when resolving the question of nonobviousness in a court of law [here the PTO].”

As was further stated in Uniroyal, Inc. v. Rudkin-Wiley Corp., 5 U.S.P.Q.2d 1434 (CAFC 1988):

“Where prior art references require selective combination by the court to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned from the invention itself...*Something in the prior art must suggest the desirability and thus the obviousness of making the combination.*” [Emphasis supplied.]

In line with these decisions, the Board stated in Ex parte Levengood, 28 U.S.P.Q.2d 1300 (P.T.O.B.A.&I. 1993):

“In order to establish a *prima facie* case of obviousness, it is necessary for the examiner to present *evidence*, preferably in the form of some teaching, suggestion, incentive or inference in the applied prior art, or in the form of generally available knowledge, that one having ordinary skill in the art *would have been led* to combine the relevant teachings of the applied references in the proposed manner to arrive at the claimed invention. ... That which is within the capabilities of one skilled in the art is not synonymous with obviousness. ... That one can *reconstruct* and/or explain the theoretical mechanism of an

invention by means of logic and sound scientific reasoning does not afford the basis for an obviousness conclusion unless that logic and reasoning also supplies sufficient impetus to have led one of ordinary skill in the art to combine the teachings of the references to make the claimed invention. ... Our reviewing courts have often advised the Patent and Trademark Office that it can satisfy the burden of establishing a *prima facie* case of obviousness only by showing some objective teaching in either the prior art, or knowledge generally available to one of ordinary skill in the art, that 'would lead' that individual 'to combine the relevant teachings of the references.' ... Accordingly, an examiner cannot establish obviousness by locating references which describe various aspects of a patent applicant's invention without also providing evidence of the motivating force which would impel one skilled in the art to do what the patent applicant has done."

In the present case, there is no reason given in the last Office Action to support the proposed combination, other than the statement "... to modify the adapter assembly of Edwards with the teachings of Bazille to provide gaps between the outer race and the shoulders to reduce the force placed upon the race when impacted, reducing damage and wear on the bearing". However, this reason for combining the two references was provided by the Applicant in the original application (last paragraph on page 4 of the Applicant's Specification), not by any of the cited references. Again as stated in Uniroyal, Inc. v. Rudkin-Wiley Corp., 5 U.S.P.Q.2d 1434 (CAFC 1988):

"Where prior art references require selective combination by the court to render obvious a subsequent invention, there must be some reason for the combination *other than the hindsight gleaned from the invention itself...Something in the prior art must suggest the desirability and thus the obviousness of making the combination.*" [Emphasis supplied.]

The Applicant therefore submits that combining Edwards and Bazille is not legally justified and is therefore improper. Thus, the Applicant submits that the rejection on these references is also improper and should be withdrawn.

Applicant respectfully requests, if the claims are again rejected upon any combination of references, that the Examiner include an explanation in accordance with M.P.E.P. § 706.02, Ex parte Clapp, 27 U.S.P.Q. 972 (P.O.B.A. 1985) and Ex parte Levengood, supra, a “factual basis to support his conclusion that it would have been obvious” to make the combination.

**The novel physical features of claims 13 – 22 produce new and unexpected results and hence are unobvious and patentable over the references under § 103**

The reason given by the Examiner in the last Office Action for rejecting claims 1 – 12 under § 103 on the grounds of obviousness, “... to modify the adapter assembly of Edwards with the teachings of Bazille to provide gaps between the outer race and the shoulders to reduce the force placed upon the race when impacted, reducing damage and wear on the bearing” acknowledges that the combination produces an advantage, namely that bearing damage and wear are reduced. As noted previously, this was an advantage identified by the Applicant in the present patent application, not one that is stated in any cited prior-art reference. The Applicant submits that the fact that the combination produces advantages mitigates in favor of the Applicant because it proves that the combination produces new and unexpected results and is hence unobvious.

Further advantages already identified by the Applicant within the original application are increased assembly tolerances and resistance to assembly damage when installing the bottom bracket within a bicycle frame. The present invention also dramatically increases ease of assembly over the proposed combination of Edwards and Bazille in the following way: it accurately and consistently locates drive-side crank arm axial alignment because the crank arm itself cannot change positions relative to the drive-side cartridge bearing. In Edwards’s crank arm and spindle assembly, precise positioning and arranging of spacers between the two crank arm and spindle pieces is required to accurately position the drive-side crank arm (see Edwards, 5,493,937, column 6, lines 17 – 36). This troublesome and error-prone assembly procedure would remain given the proposed combination but is eliminated by the present invention.

Therefore, the Applicant submits that the novel physical features of claims 13 – 22 are unobvious and hence patentable under § 103 since they produce new and unexpected results over Edwards and Bazille, or any combination thereof.

**Edwards And Bazille Are Individually Complete Such That There Is No Obvious Reason To Combine Them**

Edwards's invention already requires the inner race of at least one cartridge bearing to be free to move in both axial directions on the bottom bracket spindle to allow for assembly of the separate crank arm and spindle pieces. Thus the bearing is already protected from axial over-load situations as discovered by the Applicant and disclosed in his original Specification. There is therefore no obvious reason to combine the outer adaptor assembly of Bazille with Edwards to achieve a result that Edwards already achieves.

**Edwards And Bazille Teach Away From Each Other By Taking Mutually Exclusive Paths To Reach Different Solutions To A Problem**

Both Edwards and Bazille are attempting to solve problems associated with connecting bicycle crank arms to the bottom bracket spindle. Yet each inventor has taken mutually exclusive paths to improve the connection between these pieces. Edwards splits the bottom bracket spindle into two pieces and integrates these pieces with each crank arm. Thus the spindle is completely separable from the outer adapter assembly and is required to be so for assembly purposes. Bazille simply seeks to improve the physical junction of each crank arm with the adapting portions on each spindle end. Thus the spindle is not separable from the outer adapter assembly and cannot be made so. Therefore, the resulting bearing arrangements of each reference are a result of each inventor taking mutually exclusive paths to solve the same problem and it is not logical or obvious to combine them.

**Even If Edwards And Bazille Were Combined In The Manner Proposed, The Combination Would Not Show All Of The Novel Physical Features Present In Claims 13 – 22**

However, even if the combination of Edwards and Bazille were legally justified, claims 13 – 22 would still have novel (and unobvious) physical features over the proposed combination. In other



words, the Applicant's invention, as defined by claims 13 – 22, comprises much more than merely modifying Edwards's adaptor assembly to allow an outer bearing race to move freely in an axial direction.

Specifically, clauses (b), (b), (c), and (d) of independent claims 13, 17, 21, and 22, respectively, clearly distinguish the Applicant's assembly over Edwards and Bazille, or any combination thereof, since these clauses all recite inner and outer axial stop elements that axially fix both of the inner races of the cartridge bearings on the bottom bracket spindle. Additionally, clauses (c), (d), and (e) of independent claims 17, 21, and 22, respectively, clearly distinguish the Applicant's assembly over Edwards and Bazille, or any combination thereof, since these clauses all recite:

“the ends of said spindle comprise adapting portions to receive crank arms such that said crank arms abut against the outer stop elements in an axial direction.”

Neither Edwards nor Bazille show either of these features because neither of their inventions employ outer stop elements that fix both the inner bearing races onto the spindle in an axial direction. The additional use of the outer stop elements as a means for axially locating attached crank arms provides a major advantage to this system over both Edwards and Bazille: the consistent and accurate alignment of the crank arms relative to the bottom bracket bearings and hence bicycle frame.

#### **The Dependent Claims Are A Fortiori Patentable Over Edwards And Bazille**

New dependent claims incorporate all the subject matter of the independent claims 13, 17, 21, and 22 and add additional subject matter which makes them a fortiori and independently patentable over these references.

**Additional Prior Art References Edwards (US 6,116,114), Hopper (US 4,552,468), Gordon (US 4,788,759), Hafla (US 3,943,803), Brion (US 5,424,997), Bickerton (US 4,191,488), Ludlow (US 648,077), Scott (US 627,597), And Brown (US 596,846)**

The applicants have reviewed all of these final references and submit that they do not show the present invention or render it obvious.

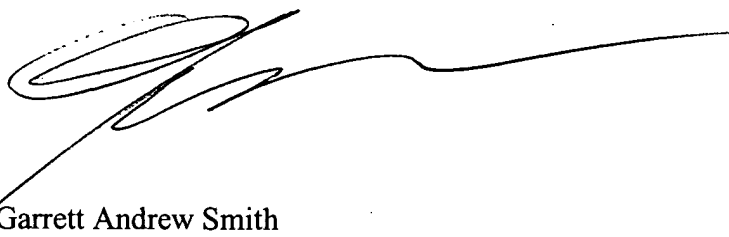
**Conclusion**

For all the above reasons, the Applicant submits that the specification and claims are now in proper form, and that the claims all define patentably over the prior art. Therefore, the Applicant submits that this application is now in condition for allowance, which action he respectfully solicits.

**Conditional Request For Constructive Assistance**

The applicant has amended the claims of this application so that they are proper, definite, and define novel structure which is also unobvious. If, for any reason this application is not believed to be in full condition for allowance, the applicant respectfully requests the constructive assistance and suggestions of the Examiner pursuant to M.P.E.P. §706.03(d) and §707.07(j) in order that the undersigned can place this application in allowable condition as soon as possible and without the need for further proceedings.

Very Respectfully,



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